Calendar

NOVEMBER

4 Lansing, Capital City Airport, Bureau of Aeronautics Auditorium. Michigan Aeronautics Commission Meeting . Call 517-335-9943.

17 Pontiac, Okland County Commisioners Auditorium. Pilot Safety Seminar with special guest speaker Mr. Frank Gattolin. Mr. Gattolin is presently a safety investigator for the National Transportation Safety Board and holds a Commercial Pilot, CFI and AIGI certificates with 11,000 hours flight experience. Call 517-335-9915.

YEAR 2000 INTERNATIONAL AVIATION

ART CONTEST

Young artists from across Michigan are invited to enter the Year 2000 International Aviation Art Contest. Sponsored at the state level by the Michigan Department of Transportation, Bureau of Aeronautics, the contest seeks to encourage young people to become familiar with the many facets of aviation and aeronautics. Other sponsors include the National Aeronautic Association, the National Association of State Aviation Officials, the Federal Aviation Administration, and the Fédération Aéronautic Internationale.

The theme for this year's contest is "Flight Into The Future." Competition is open to students age 6-17 and will be judged in three separate age categories, with first, second, and third place winners selected in each. First-place winners in each category will advance to the national competition in Washington, D.C. National winners will compete with entries from other nations in late spring.

Entries must be received by February 4, 2000. For a copy of the contest brochure, which includes rules and an entry form, please write to Michigan Bureau of Aeronautics, Attn: Aviation Art Contest, 2700 E. Airport Service Dr., Lansing, Michigan 48906-2160, or call 517-335-9977. Complete contest details are also available on the Bureau of Aeronautics website at www.mdot.state.mi.us/aero/.

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Runway Incursions

Coming Soon to Your Favorite Airport

by Philip Tarlalone

Whether you fly a J-3 Cub in and out of grass strips, or maneuver a 747 through the maze at Detroit Metro, you will likely experience a runway incursion sometime during your flying career. The National Transportation Safety Board (NTSB) first addressed the runway incursion issue in a 1986 safety study. Subsequently, in 1990, they placed runway incursions at the top of the "Most Wanted Aviation Safety Improvements" list. It has remained in that spot every year since.

From 1990, five fatal collisions and several near misses (at both towered and nontowered airports) have highlighted the seriousness of runway incursions. Two recent incidents show the potential devastation associated with the issue. The first occurred on April 1, 1999 at Chicago's O'Hare International Airport. The second incident occurred on June 28, 1999 at New York's John F. Kennedy International Airport. Both incursions occurred when an aircraft taxied onto an active runway while another aircraft was departing.

The FAA, the Air Line Pilots Association (ALPA), and other aviation groups are addressing the escalating runway incursion problem. This two-part article will examine some human factors associated with runway incursions, and present some prevention strategies to maintain safety during ground operations.

Defining the Problem

Aircraft entering active runways without authorization (runway transgressions), or making other safety-related errors, are surface incidents. Most surface incidents usually end with embarrassment and a "scolding" by air traffic control (ATC). A runway incursion, however, is a surface incident that creates a traffic conflict–a go-around, aborted takeoff, or, in the worst case, a high-speed collision. Unlike a surface incident, an incursion usually leads to an FAA enforcement action.

Continued on Page 4

COMMISSION ACTION

The Michigan Aeronautics Commission met in Iron Mountain on July 15, 1999. During the meeting, commissioners approved a special proclamation in honor of aviation pioneer, Mario Fontana, who died in December 1998. In other action, commission members approved funding totaling $1.7 million for eleven airport improvement projects.

Some projects have federal, state, and local funding, while others are funded from state and/or local sources alone. Commission approval for federally funded projects authorizes state participation, subject to issuance of a federal grant. Federal and state dollars for airport development are primarily from restricted, user generated funds. The primary sources of revenue are aviation fuel and passenger taxes, as well as aircraft registration fees.

Following are approved projects:

GRANTS

EVART

Evart Municipal Airport - an allocation of $25,000 for wetland monitoring. The proposed budget consists of $22,500 state and $2,500 local funds.

GROSSE ILE

Grosse Ile Municipal Airport - an allocation of $46,500 for improvements to the airport drainage system. The proposed budget consists of $23,250 state and $23,250 local funds.

HOLLAND

Tulip City Airport - an allocation of $140,000 for an environmental assessment and for a cost-benefit analysis for a proposed future runway extension project. The proposed budget consists of $126,000 federal, $7,000 state, and $7,000 local funds.

LAPEER

Dupont-Lapeer Airport - an allocation of $240,000 for land acquisition. The proposed budget consists of $216,000 federal and $24,000 local funds.

NILES

Jerry Tyler Memorial Airport - an allocation of $35,000 for design work for future taxiway and apron rehabilitation and for the first phase of an approach protection plan. The proposed budget consists of $31,500 federal, $1,750 state, and $1,750 local funds.

PONTIAC

Oakland County International Airport - an allocation of $450,000 for a master plan update and to acquire a snow removal vehicle. The proposed budget consists of $405,000 federal, $22,500 state, and $22,500 local funds.

ROMEO

Romeo State Airport - an allocation of $200,000 to acquire land for approach protection. The proposed budget consists entirely of state funds.

ST. IGNACE

Mackinac County Airport - an allocation of $165,000 for design work on a wetland mitigation project. The proposed budget consists of $148,500 federal, $8,250 state, and $8,250 local funds.

SAULT STE. MARIE

Chippewa County International Airport - an allocation of $400,000 for purchase of an airport rescue and firefighting vehicle. The proposed budget consists of $360,000 federal, $20,000 state, and $20,000 local funds.

ZEELAND

Ottawa Executive Airport - an allocation of $2,000 to install lights on a communication tower. The proposed budget consists of $1,800 state and $200 local funds.

LOAN

HART-SHELBY

Oceana County Airport - a loan of $15,000 in state funds to supplement a previously approved airport expansion project.

Accident Reports

Accident Reports are reprinted from Federal Aviation Administration (FAA), National Transportation Safety Board (NTSB), or Police reports and are for information only. *Michigan Aviation* does not attest to the accuracy of these reports. We do not determine the cause of accidents; that is left to NTSB and FAA investigators.

MAY

28 Kalamazoo/Battle Creek International Airport, C210N, pleasure flight, injuries: none; aircraft damage: substantial, Wx: VFR. Accident Report: Aircraft touched down half way down Runway 27, at which point the pilot elected to perform a go-around. The aircraft overran Runway 27 impacting the airport permiter fence and a vehicle that was southbound on a north-south road. It finally impacted a second fence located along west side of the road.

JUNE

7 Drummond Island, PA-28, pleasure/instructional flight, injuries: 3 fatal; aircraft damage: destroyed, Wx: VFR. Accident Report: Aircraft departed Rwy 26 and impacted trees and terrain just off the depatrure end of the runway. A witness reported seeing the aircaft just above the trees in a shallow left bank and gradually descending. Another witness stated that the aircraft was approximately 200 yards down the runway and had not lifted off. Witness also stated the winds were over 20 knots and gusting.

26 Kalamazoo/Battle Creek International Airport, B75, pleasure flight, injuries: none; damage: substantial, WX:KAZO METAR 262010Z VRB06KT 7SM FEW047 30/19 A2988. Accident Report: Aircraft spun around after landing collapsing the main landing gear.

JULY

11 Hubbard Lake, C150, Type of Flight Unknown, injuries: fatal; damage: destroyed, WX: METAR KAPN 111854Z VRB06KT 10SM CLR 24/11 A3021 RMK A02 SLP2 Accident Report: Witnesses reported seeing the airplane flying between 50 and 200 feet above the surface of a lake when it began a steep climb. Witnesses reported that the airplane rolled to the left and descended in a steep nose down attitude until it collided with the ground west of the lake's shoreline.

16 Oakland/Troy, C411, business flight, injuries: none; damage: substantial, WX: METAR KDET 162245Z 24016KT 5SM HZ FEW050 33/16 A3005. Accident Report: Started left engine normally, then started right engine. Right engine exploded. Aircraft was evacuated.

18 Oakland/Troy, C310, pleasure flight, injuries: none; damage: substantial, WX: METAR KPTK 182153Z VRB05KT 7SM FEW036 BKN080 BKN200 28/21. Accident Report: Aircraft landed gear up.

20 Greenville, C172, instructional flight, injuries: unknown; damage: substantial, WX: VFR. Accident Report: A student pilot, lost control of aircraft on landing. It veered off runway and struck the segmented circle around the wind tee.

31 Marine City, BE90, pleasure flight, injuries: 10 fatal; aircraft damage: destroyed, Wx: KMTC 311155Z 20010KT 10SM SCT150 OVC250 28/22 A2970. Accident Report: Witnesses reported the aircraft climbed to about 150 to 250 feet above ground level, clearing a 90 foot high power line. The aircraft then went into a steep left bank and impacted the ground in a steep nose down attitude.

AUGUST

13 Paw Paw, PA28, business flight, injuries: 4 fatal; aircraft damage: destroyed, Wx: METAR KAZO 131453Z 25009KT 9SM OVC013 23/21 A2969. Accident Report: The aircraft was destroyed when it experienced an in-flight breakup prior to impacting the ground about 3 miles south of Paw Paw, Michigan. The outboard section of the right wing and empennage were located approximately 0.5 miles north of the main wreckage.

17 Harsens Island, PA28, pleasure flight, injuries: none; aircraft damage: substantial, Wx: METAR KPHN 172100Z AUTO 27006G14KT 10SM SCT065 28/17 A2993. Accident Report: The aircraft reportedly experienced a loss of engine power immediately after takeoff. The pilot elected to land on the remaining runway. The aircraft ran off the end of the runway striking a levee and coming to rest in a pond.

SEPTEMBER

10 Owosso, Experimental, pleasure flight, injuries: fatal; aircraft damage: destroyed, WX: VFR. Accident Report: The aircraft departed Owosso Community Airport on runway 28 and was returning to the airport due to engine problems. Witness indicated the airplane was trailing a whitish-gray smoke. The aircraft crashed on short final to runway 10.

Continued from page 5

In another scenario, ATC instructs you to "taxi into position and hold." While you are holding in position, the controller issues you additional departure instructions. You read back the instructions and begin your takeoff roll. Once again, you have committed a runway transgression. You may not depart until you hear "cleared for takeoff."

Both scenarios are examples of expectation bias. The latter example was the catalyst for the March 1977 accident at North-Tenerife in the Canary Islands–the worst aviation disaster in history. The pilots of a fully loaded 747, holding in position in dense fog, just received their instrument departure instructions and immediately began their takeoff roll. Subsequently, the aircraft collided with another fully loaded 747 that was taxiing on the same runway. Of the 644 people on board the two aircraft, only 61 survived.

Readback/Hearback

"Readback / hearback" errors are a combination of expectation bias and communication errors. In an ideal situation, the controller issues a clearance, the pilot reads it back, and the controller acknowledges ("hears back") the readback. Errors begin to appear when the airport gets busy and work loads increase. For instance, a pilot may expect a taxi clearance to runway 10R but receives a clearance for 10L instead. Because of a preconceived mind-set, the pilot "hears" and reads back 10R. The busy controller expects to hear 10L and does not catch the mistake.

A situation similar to this scenario occurred at Lambert-St. Louis International in St. Louis, Missouri in November 1994. The pilot of a Cessna 441 was cleared to a runway that was parallel to his arrival runway. The pilot had a preconceived mind-set (expectation bias) that he would depart on his arrival runway. He proceeded to taxi into position and hold at an intersection on that runway. A departing MD-80 collided with the Cessna. The collision killed two people.

Mistakes such as transposing numbers (runway 20 vs. runway 02), and confusing aircraft with similar call signs (N3906U vs. N8906V) exacerbate the readback / hearback situation. Other problems arise when behind-the-scenes tasks distract controllers or pilots. For the pilots these may include completing checklists or contacting their base of operations; the controllers may be on the phone, initiating hand-offs, or just handling too many aircraft.

Land and Hold Short Operations (LAHSO)

In the last few years Land and Hold Short Operations (LAHSO) have become one of the hottest issues in aviation. On April 11, 1997, the FAA created LAHSO, which expanded and replaced SOIR (Simultaneous Operations on Intersecting Runways). Designed to increase airport capacity, SOIR had been an air traffic control tool since 1968. Controllers used SOIR exclusively for operations on two intersecting runways. LAHSO, however, includes holding short of intersecting runways, taxiways, predetermined points, or approach and departure flight paths.

Although the FAA designed LAHSO as a method to maintain system efficiency and enhance safety, many pilots view it as potentially dangerous. In practice, two aircraft are cleared to use intersecting runways simultaneously. One aircraft is cleared to land with a restriction to hold short of a designated point on the runway. At the same time, another aircraft is cleared to take off or land on an intersecting runway. The two aircraft are essentially on a collision course. LAHSO issues have become so volatile that the Air Line Pilots Association (ALPA) and the Air Transport Association (ATA) threatened to refuse all land-and-hold-short clearances if the FAA did not address their safety concerns.

In February, the three groups agreed to revise the LAHSO procedures.

The FAA now mandates several requirements before ATC may use LAHSO procedures. Some of the requirements are as follows.

Weather conditions at the airport must be (a) at least a 1,000 foot ceiling and 3 miles visibility, (b) the runway used for hold short operations must be dry, and (c) a tailwind component or wind shear advisories must not exist. The ATIS broadcast will announce that "LAHSO operations are in effect," and the available landing distance (ALD) for the hold-short runway.

Before any pilot may participate in LAHSO, knowledge-based training must be completed. Student pilots may not be issued a LAHSO clearance. In addition, an air carrier may not be issued a clearance to land or depart when a non air carrier is landing to hold short of the air carrier's runway.

The pilot in command (PIC) is expected to decline a LAHSO clearance if it will compromise safety. Once accepted, a pilot must comply with a clearance unless a rejected landing is necessary. If a landing is not assured within one-third of the runway (or 3,000 feet, whichever is less) a go-around must be initiated. In the event of a rejected landing, the pilot must maintain safe separation from the other traffic and promptly notify ATC.

Obviously, pilots participating in LAHSO must have a high level of situational awareness and confidence in their skills. (Blind faith in the skills of the other participating pilot is an unwritten assumption.) Even with experienced pilots, the potential for runway incursions is always present. Once committed to land, several things could still go wrong. The aircraft may float, bounce, or miss the intended landing point. If a pilot becomes confused about where the hold short point is, the chances for an incursion increase dramatically.

A deceivingly-simple landing procedure can become very exciting when a hold short requirement considerably shortens the available landing distance. Remembering that the PIC is the final authority on accepting a clearance is vital. Do not be afraid to say "no" if any doubt exists.

Coping with the Problem

Solving the runway incursion problem will require a team effort by all parties associated with the surface movement of aircraft. Several government policies are focusing on the problem, and the FAA, air carriers, and other aviation groups are beginning awareness education and training programs.

This article has focused on defining and identifying the causes of runway incursions. The next issue of Michigan Aviation will suggest ways to reduce the chances of experiencing a runway incursion.

Aviation In-formation

The Bureau of Aeronautics and Western Michigan University (WMU) have entered into a unique and innovative partnership to operate the Romeo State Airport. WMU's internationally-recognized College of Aviation has assumed management responsibilities at the state-owned airport. The partnership will result in increased services at the airport, increased opportunities for WMU students, and an economic and efficient way of operating the airport. The airport has been owned by the state since November 1998, when it was purchased as part of the Bureau of Aeronautics' airport preservation program.

The college will provide a professional, full-time airport manager who will supervise two student intern managers each semester. The interns are upper-level students in the college's airport operations management degree program. WMU will also offer aircraft maintenance and flight instruction to serve local needs. A full-time airframe and power plant mechanic and a professional flight instructor will be among the staff dedicated to those services. The college has already based a Cessna 172 at the airport.

Funding for the partnership is part of the state transportation budget signed by Governor Engler in July. A one-time grant of $165,000 will be used by the college for start-up costs for the first two years of operation. After that, the operation will be self sufficient.

Western Michigan University has entered into a pilot training and hiring agreement with Northwest Airlink partner, Mesaba Airlines. The agreement will put WMU graduates on a fast track to being hired as Mesaba pilots. Under terms of the agreement, Mesaba will consider WMU graduates for employment with fewer flight hours than for other applicants. This streamlining of its requirements was agreed to by the airline after a careful review of the university's aviation program and curriculum. This is WMU's first agreement with a domestic airline. The college already trains pilots for British Airways, Aer Lingus, and Emirates Airlines.

On September 26, 1999, airline operations at the Marquette County Airport moved to the Sawyer Airport in Gwinn. A day-long airport dedication program on September 25 marked the official transfer of nearly all flight operations to Sawyer. The county airport, which has been sold, will remain open to general aviation operations for a short time. However, no services including fuel, maintenance, or snow removal will be available. Pilots are advised to check Notices to Airmen (NOTAMS) to determine the airport's status.

Regional airlines are seeking new ways to attract pilots in the face of a growing shortage. In addition to more aggressive advertising and recruiting, airlines are taking steps to build more stable corporate cultures to retain current pilots. A growing number of regional airlines are lowering their flight time requirements. A few years ago, most required a least 1,500 total and 500 multi-engine flight hours. Some airlines are now hiring applicants with as few as 1,000 total and 100 hours multi-engine. In addition, the once-common pay-for-training practice is being dropped by many airlines. Industry-wide there were 14,143 new pilot jobs last year. This year, the total is forecast to be 15,000. These statistics are from Atlanta-based AIR, Inc., which tracks pilot hiring trends and offers consulting services to aspiring airline pilots.

Two Bureau of Aeronautics staff members have received special recognition for their efforts in establishing an airport rescue and firefighting training facility to serve airports throughout Michigan. Oliver House, Airports Division Administrator and Ronald Lebbon, Project Engineer were honored by Kellogg Community College, which is home to the Great Lakes Fire Training Institute. A key component of the facility is a mobile aircraft firefighting simulator.

On October 1, 1959 six members of the Michigan Air National Guard formed MANG AERO CLUB based at Detroit Metro Wayne County Airport (DTW). This makes MANG AERO CLUB one of the oldest continuously active flying clubs in Michigan. MANG has maintained an accident free record with its 53 members while flying from one of the world's busiest airports. No longer affiliated with the National Guard, membership is diverse including ATP, Commercial, Private and Student Pilots. Numerous aircraft have been used over the years with three aircraft currently available, a Piper Archer, a Cessna 172 and a Piper Warrior. On September 23, 1999, the club celebrated its 40th anniversary during a general membership meeting. Information about the club can be obtained by contacting the membership officer at (313) 841-6934.

Runway Incursions

Coming Soon to Your Favorite Airport

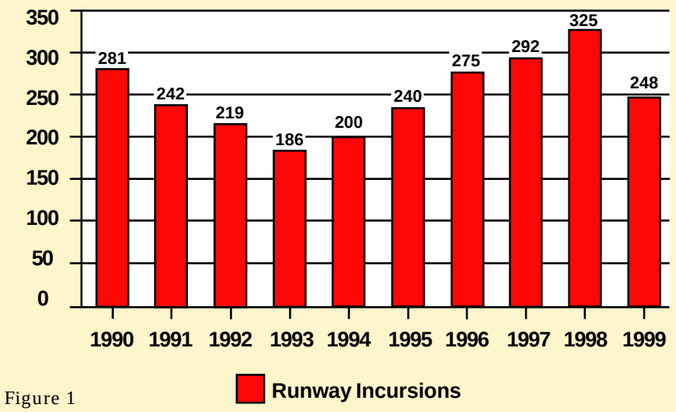

Figure 1

Continued from Cover

The FAA defines a runway incursion as "any occurrence at an airport involving an aircraft, vehicle, person, or object on the ground that creates a collision hazard or results in the loss of separation with an aircraft taking off, intending to take off, landing or intending to land." Relative to this definition, note that (a) not all surface incidents are runway incursions, and (b) not all runway incursions result in accidents. From a safety standpoint, however, all surface incidents are simply runway incursions waiting to happen.

The FAA has identified three general causes of runway incursions:

1. Pilot Deviations (pilot errors)—Any action of a pilot that results in a violation of a federal aviation regulation.

2. Operational Errors (controller errors)–An occurrence attributable to an element of the air traffic control (ATC) system that results in the following conditions:

a. Less than the applicable separation minima between two or more aircraft, or between an aircraft and obstacles. Obstacles include vehicles, equipment, or personnel on the runways.

b. An aircraft landing or departing on a run way closed to aircraft operations.

3. Vehicle/Pedestrian Deviations–Vehicle or pedestrian incursions resulting from a vehicle operator, a nonpilot operator of an aircraft, or a pedestrian who deviates onto the movement area (including the runway) without ATC authorization.

The Statistics

After the NTSB addressed the runway incursion problem in 1986, the FAA initiated several programs to reduce runway incursion accidents and incidents. Consequently, the statistics show a downward trend culminating in an all-time low in 1993. Unfortunately, the trend reversed and the rate of incursions is increasing dramatically. The 1998 statistics show an increase of more than 55 percent of the 1993 figure (see Figure 1). Most alarming is that these data are understated because they reflect only the situation at towered airports. Air traffic controllers must submit a report after every incursion, but at nontowered airports these incidents often go unreported.

A primary cause of the dramatic increase in runway incursions is that air traffic has also dramatically increased. Because of the increased traffic volume, a monumental increase in the potential for conflicts between aircraft exists. Lincoln Lounsbury (Professional Pilot, May 1998) points out that potential conflicts increase at an exponentially faster rate than the actual traffic. This increase in growth was a topic of concern at the Air Line Pilots Association annual safety conference in July 1999.

Runway Incursions at Nontowered Airports

Most of the highly-publicized runway incursions occur at towered airports. These incidents involve large aircraft and hundreds of people, and generate sensational media exposure. Data on incursions at nontowered airports, however, are only available from the NASA Aviation Safety Reporting System (ASRS)–a voluntary program. Because of this discrepancy, discussing some runway incursion factors distinctly related to nontowered airports is necessary.

Air traffic controllers are not present at nontowered airports, so every user has a personal responsibility to maintain safety. Operations at nontowered airports require all pilots and ground personnel to follow the guidelines presented in the Aeronautical Information Manual (AIM). The AIM defines traffic patterns and ground operations, and predicates the anticipation of standard procedures from all traffic. Pilots use the common traffic advisory frequency (CTAF) to announce, update, and revise their intentions. Monitoring the CTAF also confirms that everyone is operating as anticipated.

Because the CTAF is so important, its misuse is a primary cause of incursions at nontowered airports. Some pitfalls of CTAF use are omitting position reports, inaccurate position reports, having the volume turned down, accidently having the radio switched off, and using the wrong frequency. A serious problem on beautiful Saturday afternoons is frequency congestion. Often, pilots find it difficult to "break" into the radio traffic to announce their position and intentions. Using the CTAF properly, and using clear and concise terminology, is key to maintaining safety at nontowered airports.

Another significant cause of runway incursions at nontowered airports is inadequate visual clearing. Consider a high-wing aircraft waiting at the hold-short lines and aligned perpendicular to the runway. While holding short, the pilot must physically turn the aircraft to see someone on base or final. If the aircraft is parked too close to the hold-short lines, there will not be enough room to reposition the aircraft without entering the runway surface. (Remember that any part of the aircraft that is inside the hold-short lines is protruding onto the runway surface.)

Often visual clearing may be difficult or impossible. If a runway has a significant crest toward its center, seeing an aircraft that is departing from the opposite end may be impossible. Another impossible visual situation will occur at airports with intersecting runways. The Pellston Regional Airport, for example, has approximately one mile between the threshold of runway 32 and the threshold of runway 23. If two aircraft are departing simultaneously from these runways, they may not see each other until it is too late. If the wind is calm, or if the wind direction does not clearly define the use of a particular runway, the more likely it is that traffic will use conflicting runways. In these scenarios, proper use and reliance on the CTAF is paramount.

Expectation bias is another serious consideration. Expecting certain patterns and behaviors from others is natural, and we modify our own behaviors to meet these expectations. Adherence to, and expecting "standard operating procedures" also leads to trouble if an aircraft does not operate as anticipated. For example, you are second in the traffic pattern behind a Cessna 172. The pattern is busy and you are following closely behind the 172. The Cessna makes a normal landing and you expect it to depart

Figure 2

Figure3

the runway at the nearest taxiway (following section 4-3-20 of the Aeronautical Information Manual). You are now on short final and configured to land, but the Cessna continues to taxi on the runway. A go-around is your only recourse.

Misuses of the CTAF, inadequate visual clearing, and expectation bias often combine to form a fatal chain of events. The November 1996 accident at Quincy, Illinois is a perfect example. A Beech 1900 on its landing roll collided with a King Air A90 attempting to takeoff. The pilots in the King Air failed to announce their intentions to takeoff and also failed to monitor the CTAF. The pilots in the Beech 1900 expected the King Air to hold in position. Both aircraft failed to visually clear the airspace during their operations. Exacerbating the confusion was an inappropriate CTAF transmission by a new private pilot holding short of the departing King Air's runway. Fourteen people died in the accident.

Runway Incursions at Tower-Controlled Airports

The causes of incursions at nontowered airports (communications, visual clearing, and expectation bias) are equally applicable at towered airports, but with different implications. At towered airports the air traffic controllers add an additional dimension to the "standard operating procedures" and an additional set of potential human errors. Communications are more complex and involve pilots, approach controllers, tower controllers, ground controllers, and ground personnel. Optimally, the controllers and pilots will work as a team and correct the other's errors. In reality, however, the "checks and balances" often breakdown, and confusion or brief lapses of concentration cause embarrassment, surface incidents, and accidents. The following discussion will address some common causes of runway incursions at towered airports, and identify some common "traps" to avoid.

Situational (Positional) Awareness

Loss of situational awareness at controlled airports is a leading cause of surface incidents and incursions. Controlled airports are inherently confusing, and "getting lost" while taxiing is common. Unfamiliarity with the airport and not using an airport diagram add to the disorientation. Pilots of smaller aircraft are at a disadvantage because they lack the perspective that pilots on the flight deck of a 747 have.

A major challenge to situational awareness is reduced visibility. Rain, snow, fog, and darkness each contribute to poor visibility, but when they work in concert, situational awareness becomes nearly impossible. On a rainy night the glare of multicolored lights reflecting from the wet concrete creates an incredibly disorienting effect. When no "grass islands" exist between the taxiways and runways, the airport surface becomes a giant "sea of concrete."

In Michigan, snow is a serious determent to situational awareness. Snow not only reduces visibility, but will completely obscure signs and surface markings. Even on clear days snow can be a problem. Snow banks created after plowing can dwarf even a large aircraft, and can make situational awareness and visual clearing difficult or impossible (see Figure 2).

The FAA standardizes runway and taxiway signs and designs them to be aids to surface navigation. Frequently, however, they contribute to surface disorientation by being inadequate or inherently confusing (see Figure 3). If these signs become broken or obstructed by snow or weeds, they are of little value. Hold-short lines and ILS critical area signs (see Figure 4)

Figure 4

can create runway transgression traps. If any part of the aircraft protrudes beyond these lines, a runway transgression has occurred–even if the aircraft has "not entered the runway."

Another transgression trap occurs when two runways originate from the same threshold area. An example of this configuration is the thresholds of runway 5 and runway 9 at the Kalamazoo/Battle Creek Airport. On the airport diagram, each threshold appears distinct. However, upon taxiing into the area it becomes a "sea of concrete" and the thresholds are not as obvious. Instructors teach student pilots to verify their alignment with the runway heading by checking their heading instruments. In this case, checking the runway to ensure that it is aligned with the heading instruments is wise also.

Operating Without a Clearance

Operating without a clearance is a serious problem at towered airports. For example, ATC instructs you to follow an aircraft to a runway that crosses a second active runway (we will use "27" for this discussion). Ground control instructs both pilots to "taxi to runway 'X' and hold-short of runway 27." Upon reaching runway 27, ATC instructs the aircraft you are following to "cross runway 27." Without thinking, you continue to follow. You have just crossed runway 27 without a clearance and have committed a runway transgression.

Continued on page 6